Introduction to Multimedia

Fundamentals of Multimedia

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Outline

• 1.1 The Outline
• 1.2 History of Multimedia
• 1.3 Typical Multimedia Software System
1.1 Outline: What is Multimedia ... ?

• The meaning of “Multimedia”? 

Many quite different, even opposing viewpoints:
– A PC Vendor
– A Consumer Entertainment vendor
– A Computer Science Student
1.1 Outline: What is Multimedia ... ?

PC Vendor
- Audio Function
- DVD-ROM Driver
- Multimedia Processor

Video Card

3D Display card

Audio Card
A Consumer Entertainment Vendor

− Interactive cable TV
− Service over High-speed internet
1.1 Outline: What is Multimedia ...

A Computer Science Student
- About Multiple Modality information application:
- Text, Image, Graphics, Animation, Video, Sound...
1.1 Outline: One typical definition

• **Multimedia definition:** The Technology to Collect, Process, Edit, Store and Present *more than two* medias at the same time
  - Including text, image, graphics, animation and moving pictures.

• **A more general definition:**
  The independent machine which is able to create, represent, process, store, retrieve the *information in various medias*
1.1 Outline: Category of medias by CCITT

- **Perception Medium**: Directly make human have the feeling to the media
  - Including human’s speech, music and various sound from natural environment, the moving image, graphics, curve, animation and text.

- **Representation Medium**: The middle method to transfer to feeling, to effectively transfer from one place to another
  - Including various audio encode, music encode, image encode, text encode, moving picture encode and still picture encode.

**CCITT**: International Telegraph and Telephone Consultative Committee
1.1 Outline: Category of medias by CCITT

- Presentation Medium: conversion between electronic signal and feeling medias
- Two kinds:
  - Input medium (including keyboard, mouse, camera, Scanner, light pen, micro-phone)
  - And output medium (including display, printer, drawer)
1.1 Outline: Category of medias by CCITT

- Storage Medium: storing the medias, in order to access the medias in local or remote place as needed
  - Hard disk, floppy disk, CD, tape,…

Transmission Medium: Transmission of the media from one place to another.
- Telephone line, Twisted line, cable, fiber, radio, …
1.1 Outline: Multimedia application

- Education

Video teleconferencing  Distributed Lectures for Higher Education
1.1 Outline: Multimedia Application

- Medicine

Telemedicine
1.1 Outline: Multimedia Application

• Spaceflight

Armstrong on the moon  Shenzhou No. 7  No1 ChangE
1.1 Outline: Multimedia Application

- Industry manufacture automation

Manufacture Automatic Monitor system  Automobile Model Design
1.1 Outline: Multimedia Application

- Culture heritage preservation and Tourism

Augmented Reality

http://www.edushi.com/
1.1 Outline: Multimedia Application

Culture heritage preservation

Dunhuang Mural
1.1 Outline: Multimedia application

- Game and Entertainment

Cooperative work environments
1.1 Outline: Multimedia VS. Computer Science

• More and more computer fields relevant to multimedia
  – Operation System
  – Networks
  – Vision Process
  – Information Retrieval
  – Real-time Systems…
**1.2 History : Beginning of the idea**

- **Newspaper**: start of communication with media
  - The first Public Media
  - Using text, graph and table

- **Film without sound**: 1910-1927, ended by the Jazz Singer
  - Jazz Singer (Music film), the first film with sound
  - Thomas A. Edison invented the moving camera in 1887
1.2 History : Beginning of the idea

- **Radio**: became the main media of broadcasting
  - Guglielmo Marconi (Italy)
  - Transmit radio signal in 1895, won Nobel Physics prize in Nov. 1909

- **TV**: The innovative media in 20th century
  - Changed the public communication all over the world
1.2 History: Initial technology

• 1945 Vannevar Bush: propose one Hypermedia System relevant concept -- “Memex”

• 1960s Ted Nelson started Xanadu project, The first test to develop Hypertext System
  – [http://www.wiki.cn/wiki/Project_Xanadu](http://www.wiki.cn/wiki/Project_Xanadu)
  – Ted Nelson, American sociologist, philosopher, Forerunner of information technology,
  – Put forward “hypertext” in 1963
1.2 History: Initial technology

- 1968 Douglas Engelbart showed another hypertext system -- “On-Line System” (NLS)
  - Douglas Engelbart, 32th touring prize (1997年) winner, the inventor of computer Mouse

- Some important idea: hyperlink, teleconference, text processing, email, window software, help system
1.2 History: Technology birth

- 80’s 20th century: Input sound, image, graphics into computer as *new information carriers*, process and output
  - Make computer application more wider, easier to use
  - Multimedia idea develops rapidly
1.2 History: Technology growing up

- 1985-Negroponte and Wiesner set up the MIT Media Lab
  - World First-level digital video and multimedia research institute

- 1989-Tim Berners-Lee suggested World Wide Web to cern
  - Berners-Lee, the father of “WWW”,
  - Now leading the non-profit organization W3C.

- 1990-Kristina Hooper Woolsey set up Apple Multimedia Lab with 100 persons
1.2 History: Technology Mature

- **1991-MPEG-1 adopted** as International digital video standard
  - In 1990s, MPEG-2, MPEG4 and other MPEG-X were proposed

- **1992-JPEG was adopted** as international digital image standard
  - Improved to JPEG2000;

- The same year, **the MBone appeared**
  - MBone (Multicast Backbone) was a virtual network set up for Internet engineering task group’s (IETF) video conference
  - It shares the same physical media with Internet, supporting audio, video and whiteboard
1.2 History: Technology Mature

- **1993**: Illinois University proposed the **NCSA Mosaic**
  - NCSA Mosaic (TM) was developed by Illinois university National Center of Super computing Application (NCSA)
  - X-Windows based Browser, the ancestors of MS IE, Netscape as well other web browser

- **1994**: Jim Clark and Marc Andresen developed the **WWW browser Netscape**
  - Netscape had *ever been in the leading position* in web browser fields and was defeated by Internet Explorer of Microsoft
  - By Nov. 1998, Netscape was purchased by AOL
1.2 History: Technology Development

- 1995, JAVA was created
- 1996, DVD video was introduced
- 1998, XML1.0 was announced as a W3C Recommendation
- 1998, handheld MP3 devices first made inroads into consumer
- 2000, WWW size was estimated at over 1 billion pages
- 2001, Wikipedia was created, a free and open encyclopedia cooperative plan. Now it has become the greatest network encyclopedia over the world
- 2001, MPEG7 was formulated
- 2005, Part13 of MPEG-21 was formulated and SVC (scalable video coding) was announced
- ……
1.2 History: Technology Research

- Multimedia processing and coding
  - Multimedia content analysis
  - Content-based multimedia retrieval
  - Multimedia security
  - Audio\image\video processing, compression, and so on

- Multimedia system support and networking
  - Network Protocols, internet, operating systems
  - Server and clients, quality of service (QoS) and Databases
1.2 History: Technology Research

- Tools, end system and application
  - Hypermedia systems, user interfaces,
  - Authoring system, multimodal interaction
  - And integration
  - Multimedia education, virtual environments
1.2 History: Applications

- Camera-based **object tracking** technology
  - Develop control systems for industrial control, gaming, and so on
- **3D motion capture**
  - Produce realistic animated models
- **Multimedia applications** aimed at handicapped persons
  - Poor vision and the elderly
- Digital fashion
- Electronic House call system
- Behavioral science model
1.2 History: Applications

- Camera-based object tracking technology

- Immersive interactive browsing in digital museum
- Vision based tracking

- Feature Acquisition
- Multi-Source Vision Data Computing
- Interactive Output
1.2 History: Applications

- 3D motion capture
  generate realistic animation model

3D motion capture
1.2 History: Applications

- Multimedia Applications Aimed at Handicapped Persons

Tracking the action of eyes.

Right figures: generate 8*8+2=66 actions; One button is return

An Automatic Eye Wink Interpretation System for the Disable
1.2 History: Applications

- Digital fashion

Mobil TV

MP3

MP4

PS2 game
1.2 History: Applications

- Digital fashion

Music Safa:

By American designer

Giongkun Wuqiongkun
1.3 Typical software system

- Music Sequencing and Notation
- Digital Audio
- Graphics and Image Editing
- Video Editing
- Animation
- Multimedia Authoring
1.3 Software: Music Sequencing and Notation

- Cakewalk, well-known older name for Pro Audio
  - Sequencing and editing MIDI music
  - To download from Course website
1.3 Software: Graphics and Image Editing

- **Adobe Illustrator**, powerful publishing tool for creating and editing vector graphics

- **Adobe Photoshop**, the standard tool for graphics, image processing, and image manipulation
  - Layers of images, graphics, and text, for maximum flexibility;
1.3 Software: Video Editing

• Adobe Premiere
  – A simple, intuitive video editing tool for nonlinear editing – putting video clips into any order
1.3 Software: Animation

• Multimedia API
  – Java3D
  – DirectX
  – OpenGL

• Rendering Tools
  – 3D Studio Max
  – Maya
1.3 Software: Multimedia Editor

- Macromedia Flash
- Macromedia Director
- Authorware
Project 1: Multimedia Art Work

• Subject 1: Audio Editing
  – Connecting the highlights of multiple songs

• Subject 2: Video Synthesis [example]
  – Create a video clip with some special effects

• Subject 3: Simple Flash
  – Create a simple flash clip
Project 1: Multimedia Art Work

• Requirements
  – Submitting the final work with the original materials
  – Submitting a simple introduction Doc to your work
  – Completing independently

  – Important date: 12pm, 3, Mar （过期不候）

  – Note: Please compress your documents into a single file package (.rar or .zip) and name it by your name and student ID like Name_ID.rar or Name_ID.zip, thanks.
The End

Thanks!

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Complementary Readings

• What’s the hot topics in Multimedia research?
  – Semantic Video Annotation, Analysis and Search
  – Image Annotation, Tagging and Retrieval
  – Multimedia Content Analysis and Applications
Readings: ACM MM2008 Papers

- http://www.mcrlab.uottawa.ca/acmmm2008/
  - --> Technical Program

- Selecting one paper, read it and submit a brief summarization. [5 points]